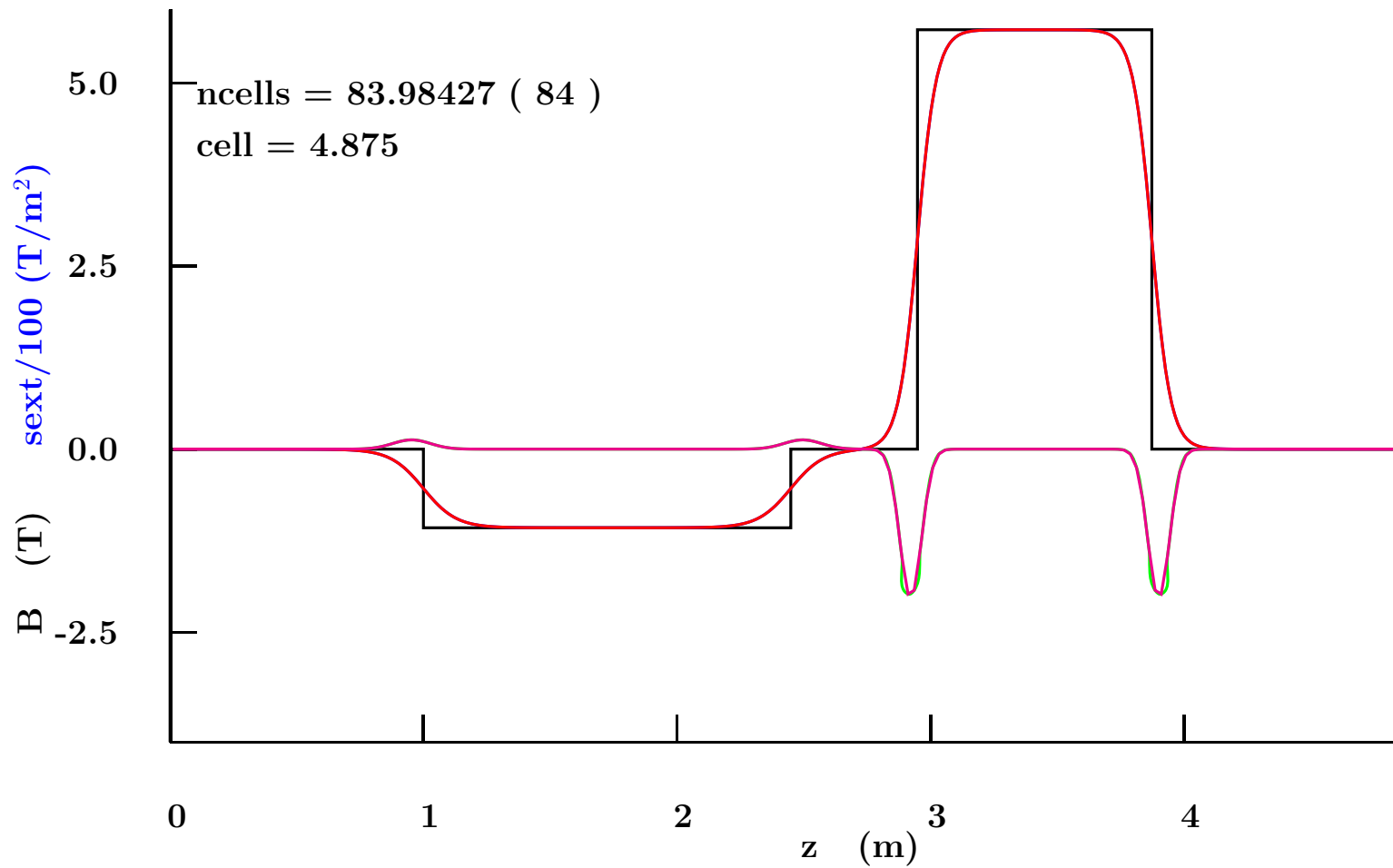


ICOOL Simulation of Berg Doublet Lattice

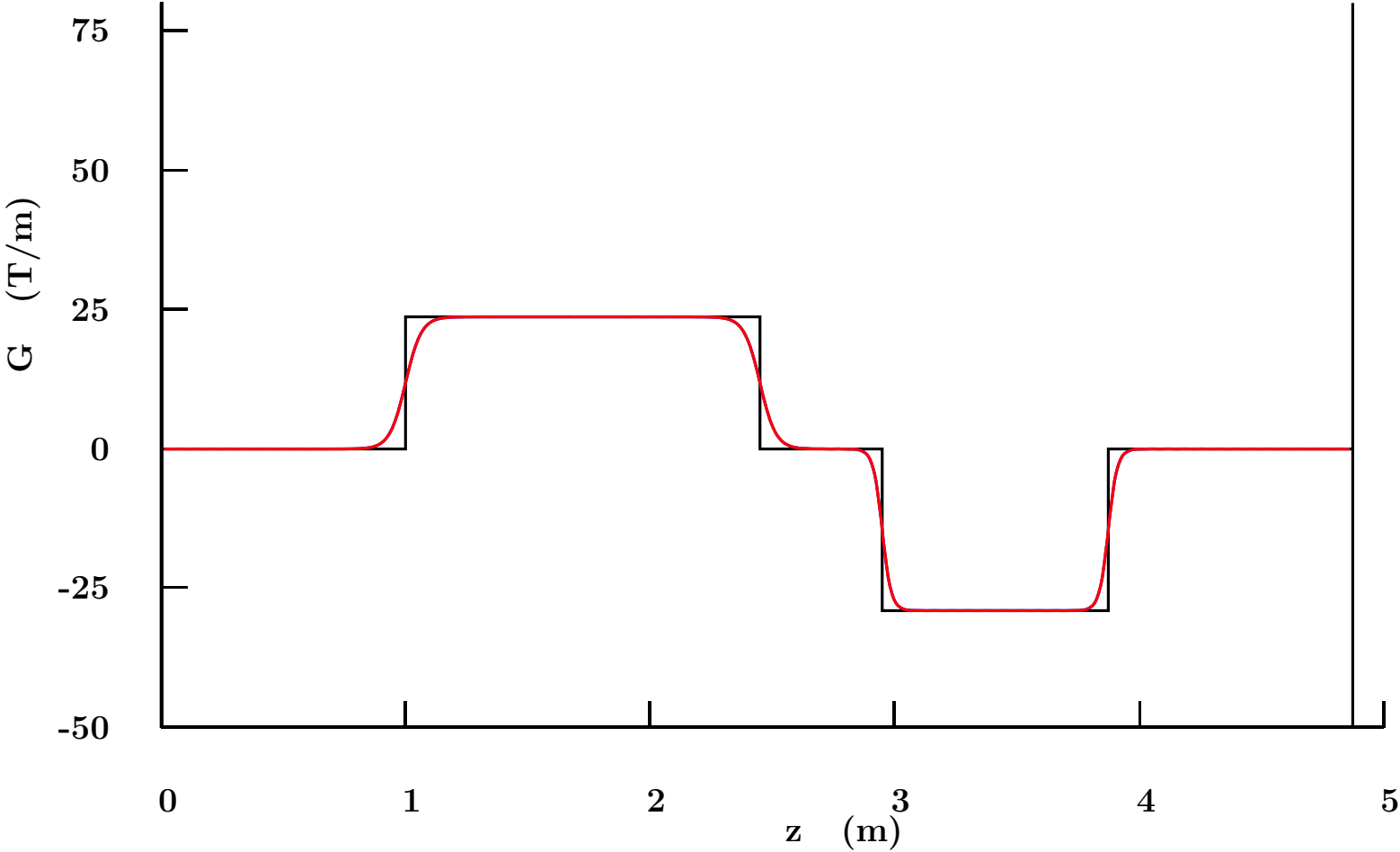
Bob Palmer S. Berg S. Kahn

- 10-20 GeV
- Linear Non-Scaling
- 30 pi mm
- Design is "cost optimum" from Berg
- Soft ends sized from TOSCA Cos Theta SC design
- End sextupoles sized from TOSCA Cos Theta SC design
- Coordinates relative to a 15 GeV/c "reference" (sorry Scott)
- Magnets are "sector" with ends perpendicular to "reference"
- Dipole, quadrupole and sextupoles defines vs. s : distance along reference
- These are then Fourier analysed in s/L_{cell} with 70 coefficients
- ICOOL calculates fields off the reference to 5th order

Black is hard shape
Red is dipole with soft ends
Magenta is sextupole

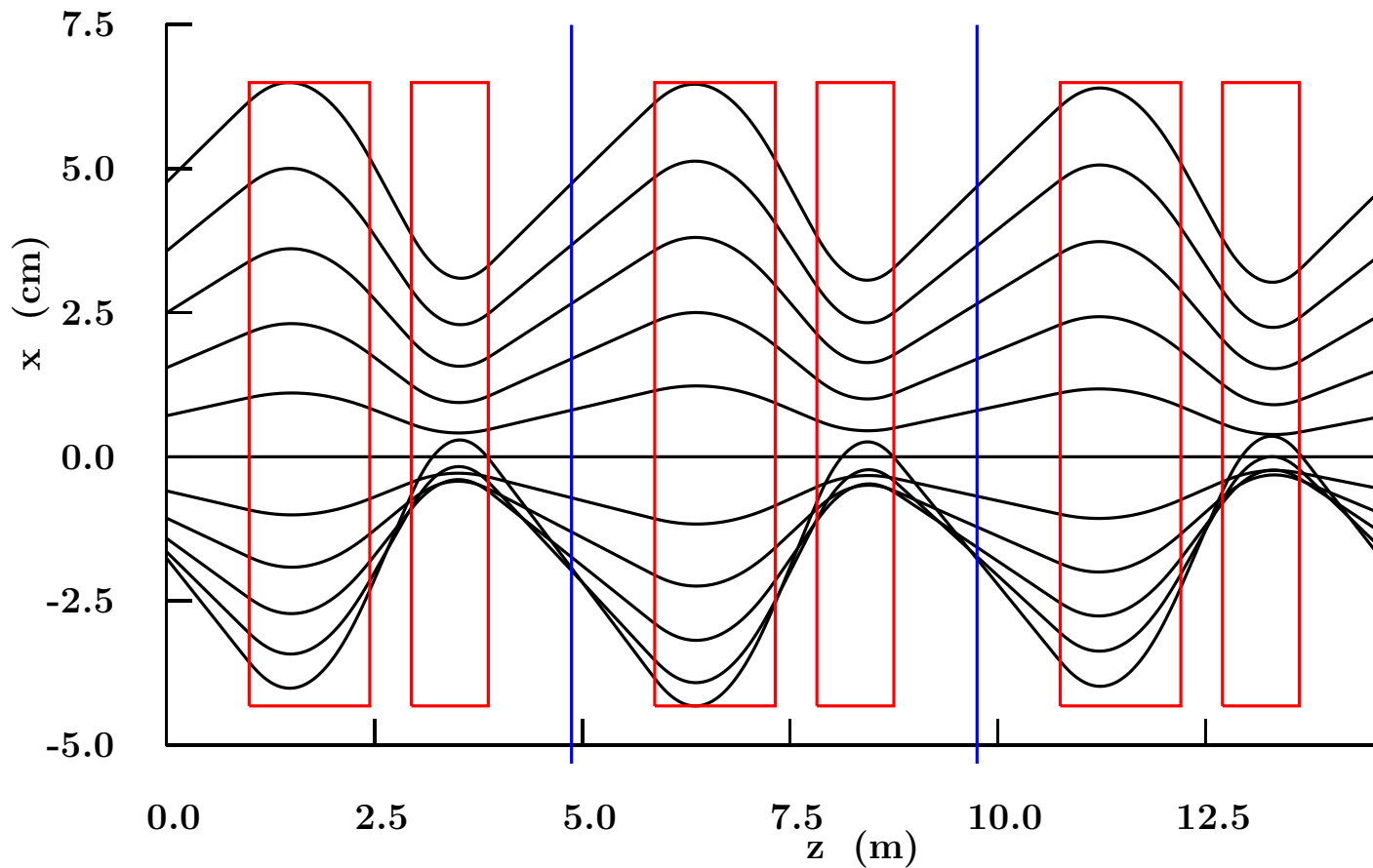


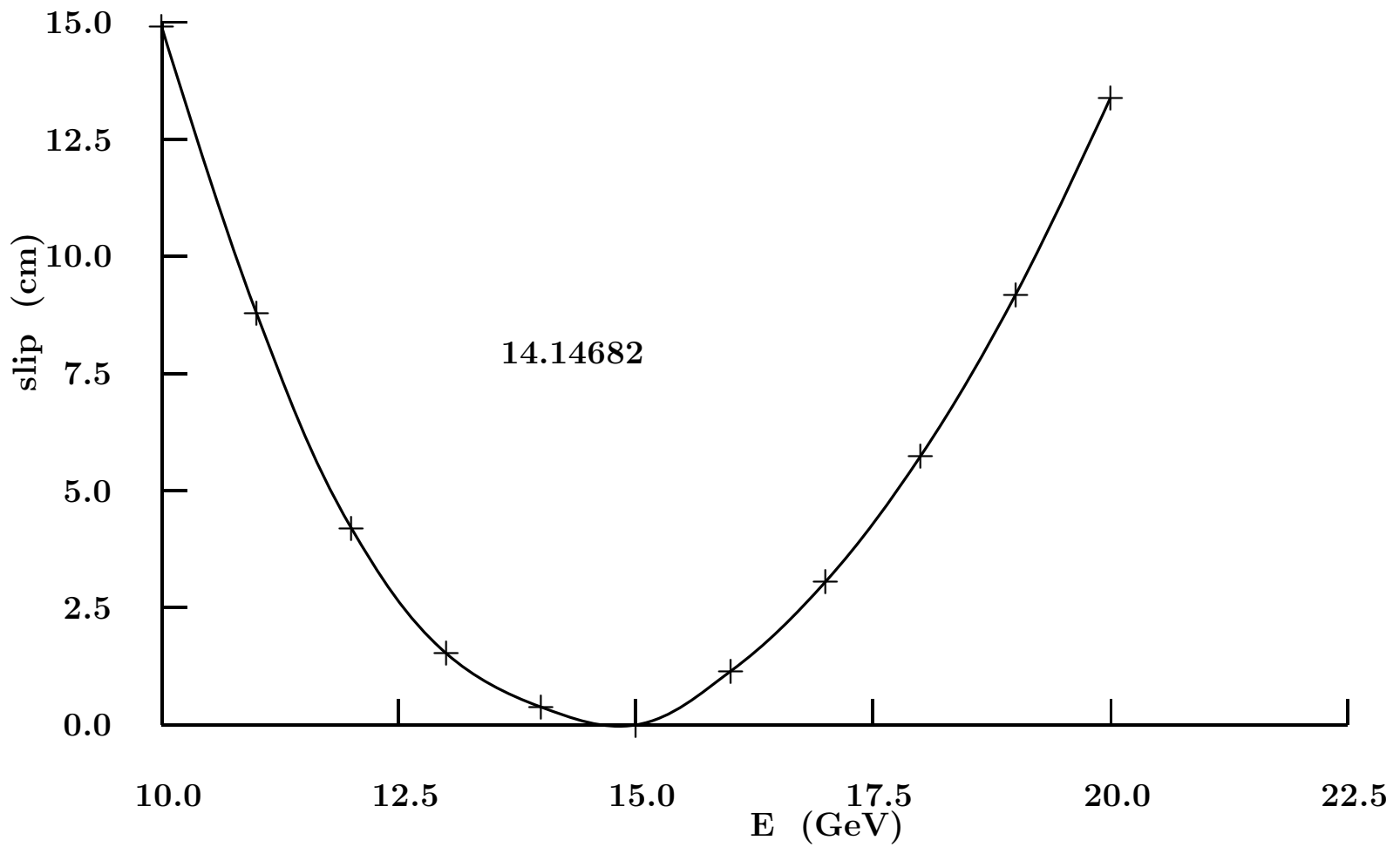
Black is hard edge gradient
Red is Gradient with soft ends

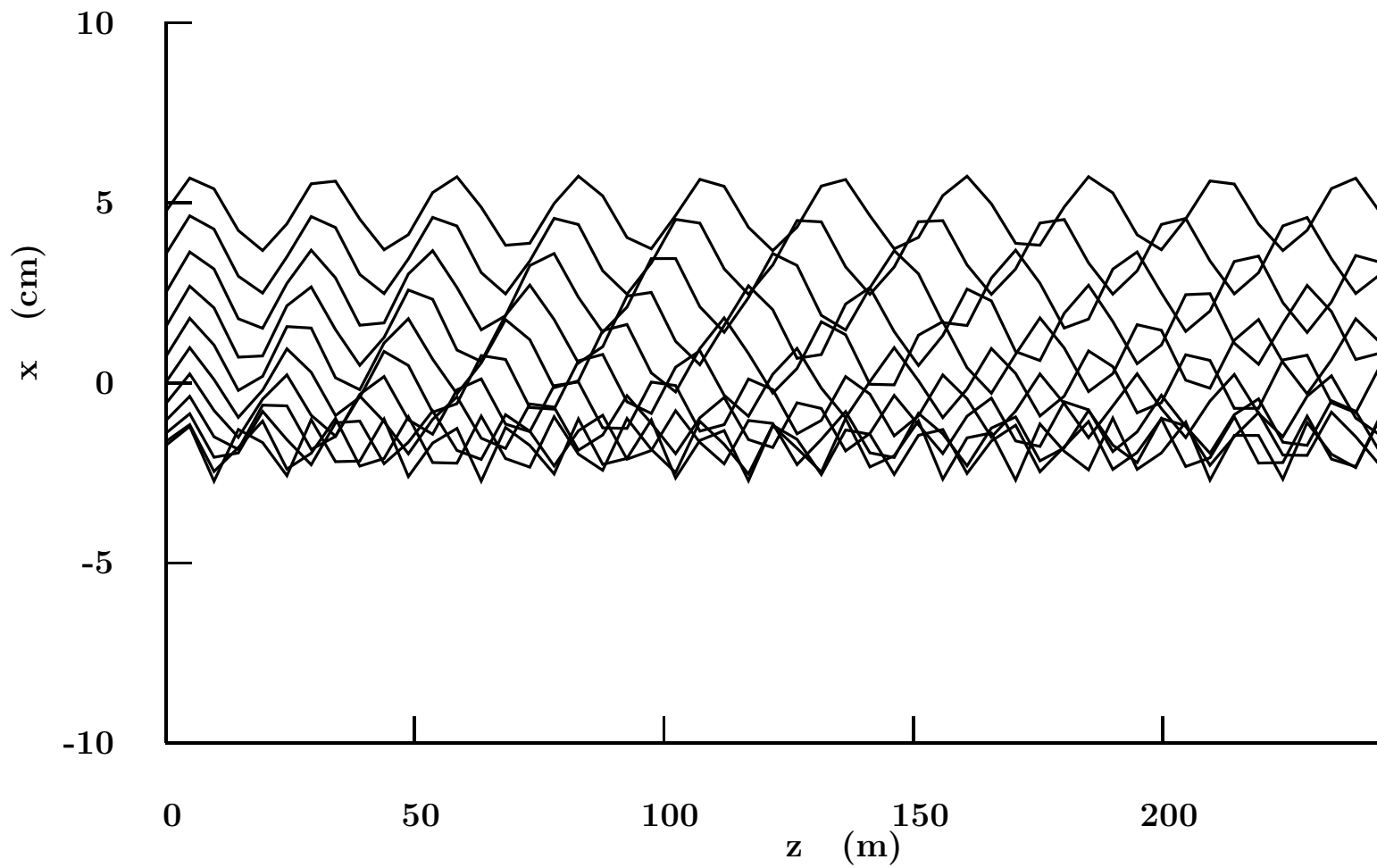


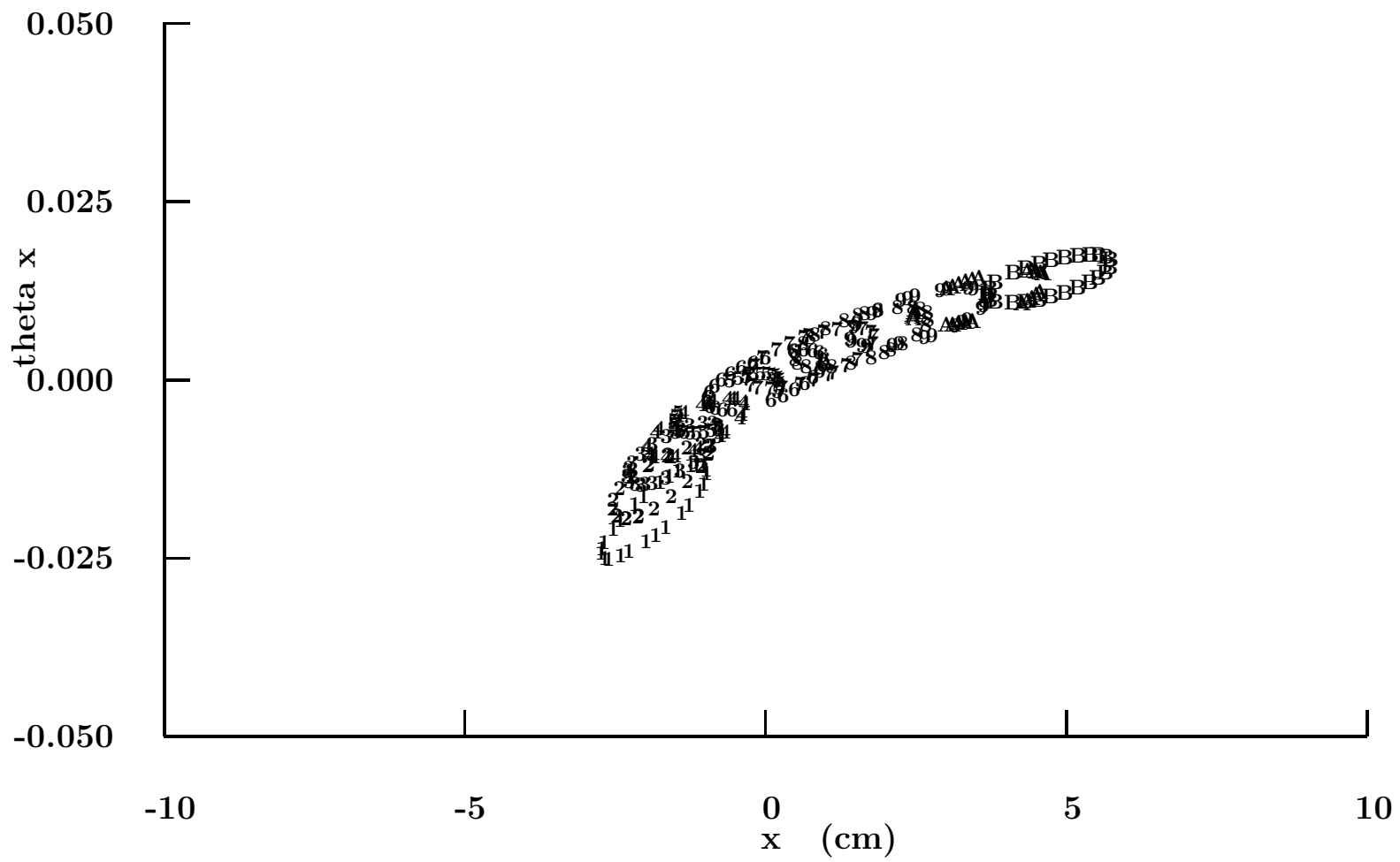
Closed orbits vs Momentum

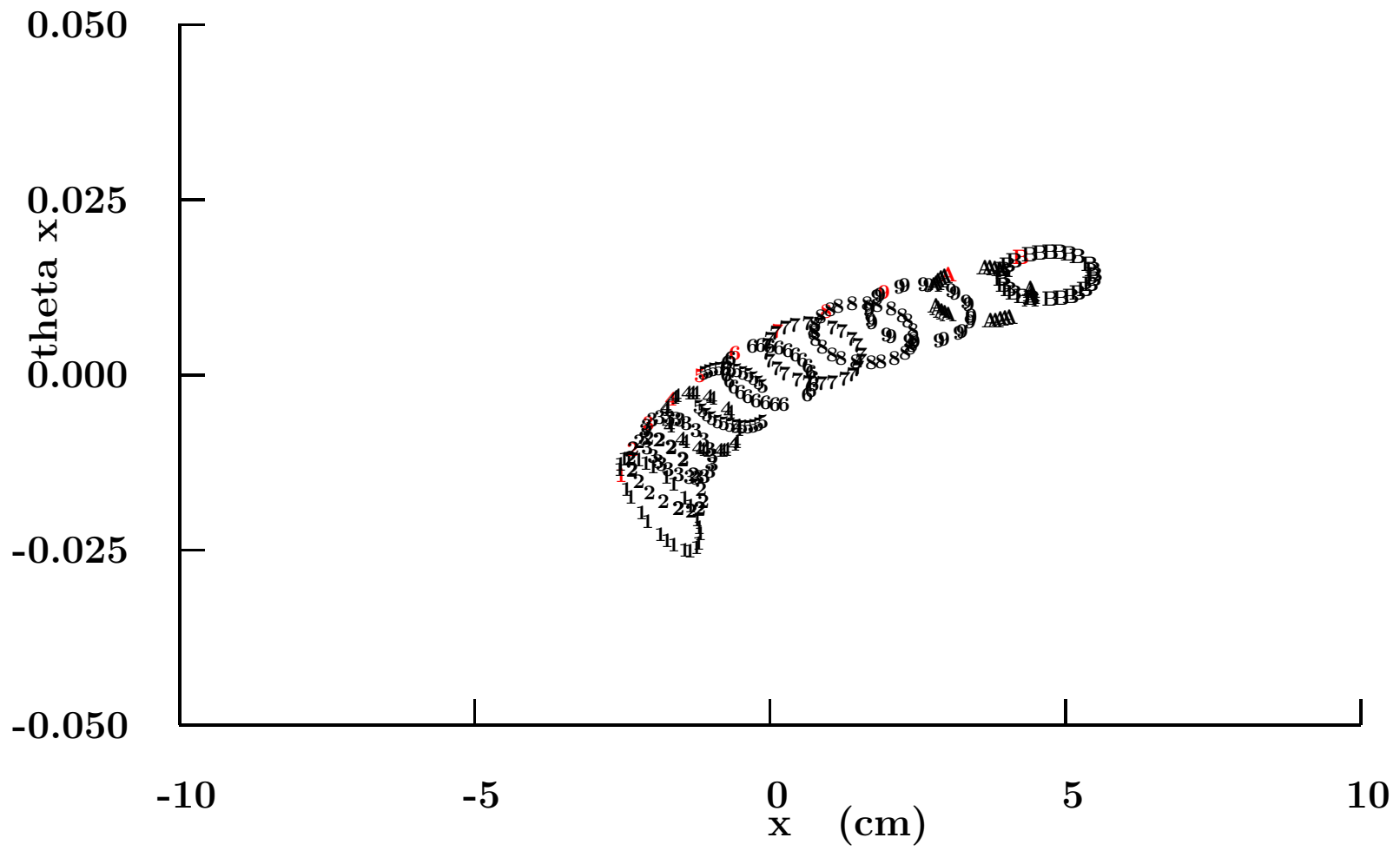
- 10 GeV (bottom) to 20 GeV in 1 GeV steps
- x is horizontal displacement perpendicular to 15 GeV track
- Centers of straight are not at a waist
- Determine: $x(p)$, $\beta_{\perp}(p)$, $x'(p)$, $\alpha(p)$



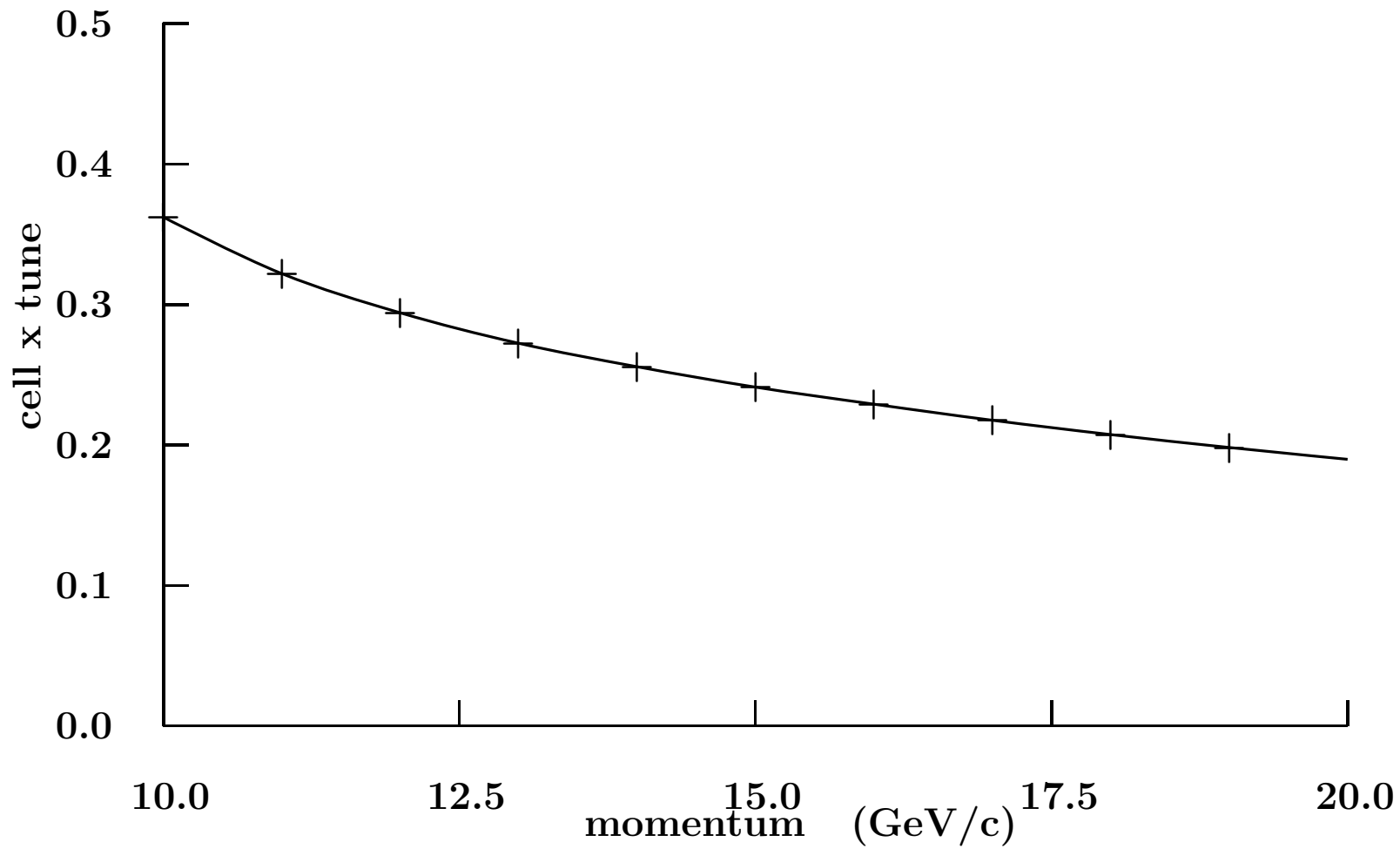


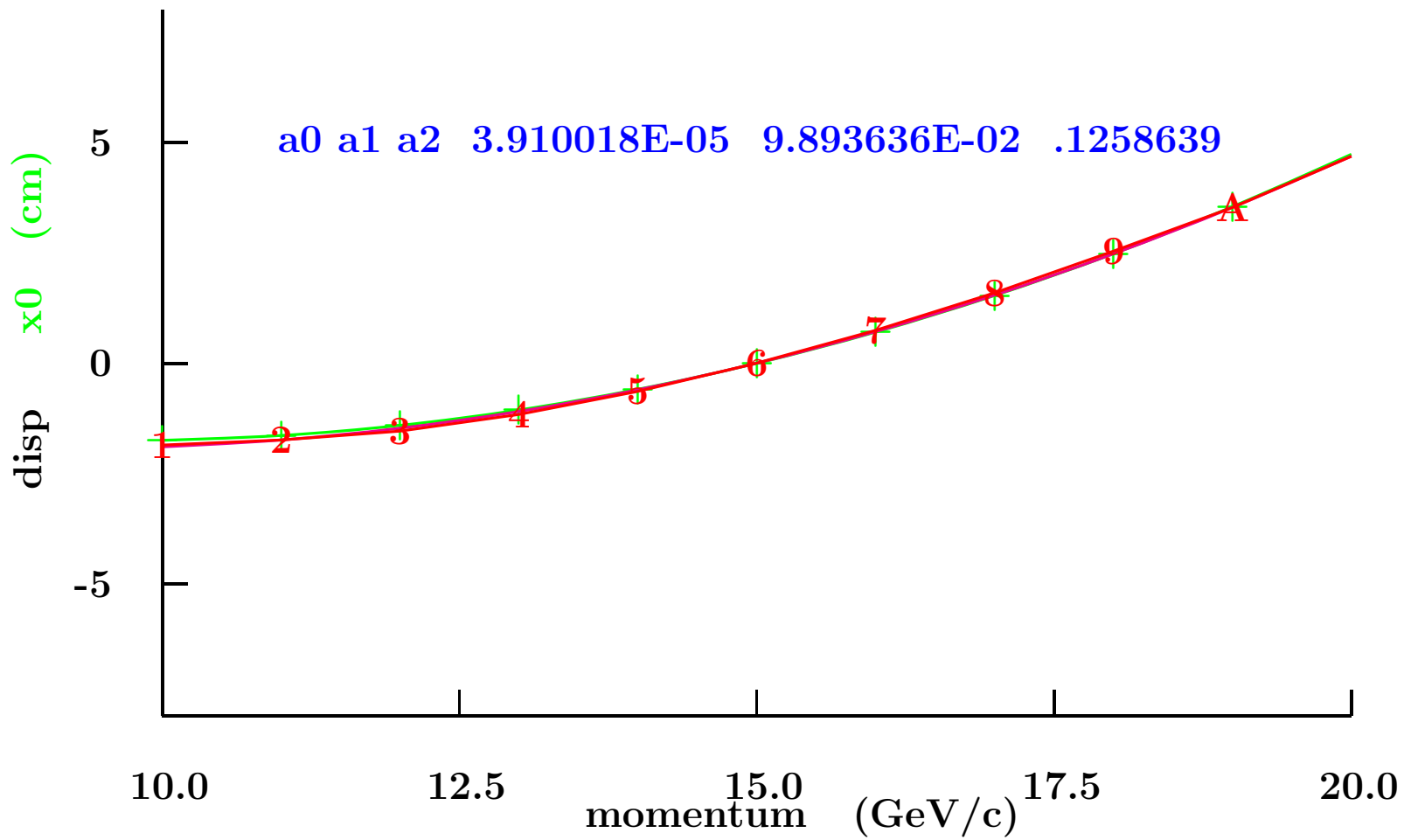


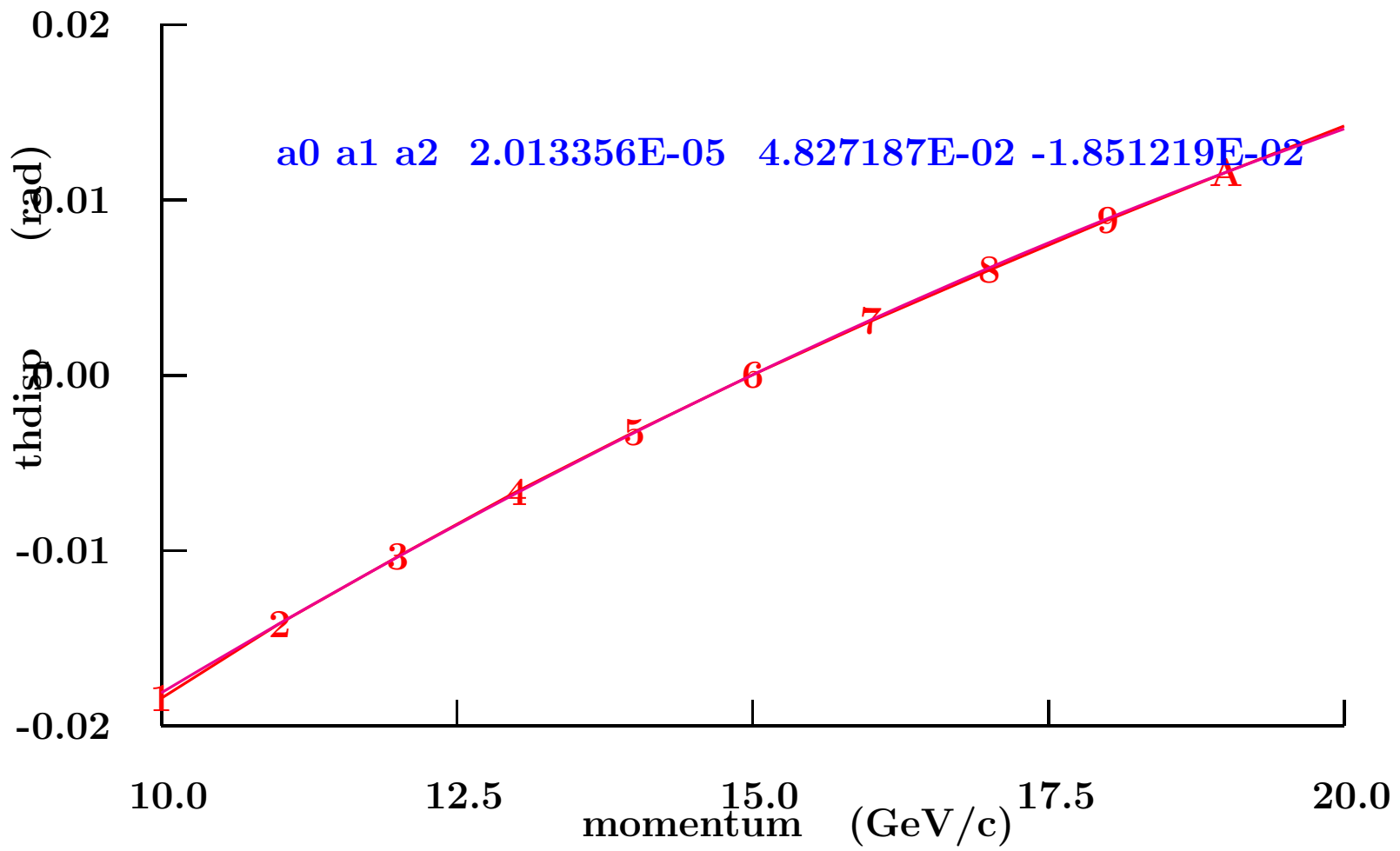


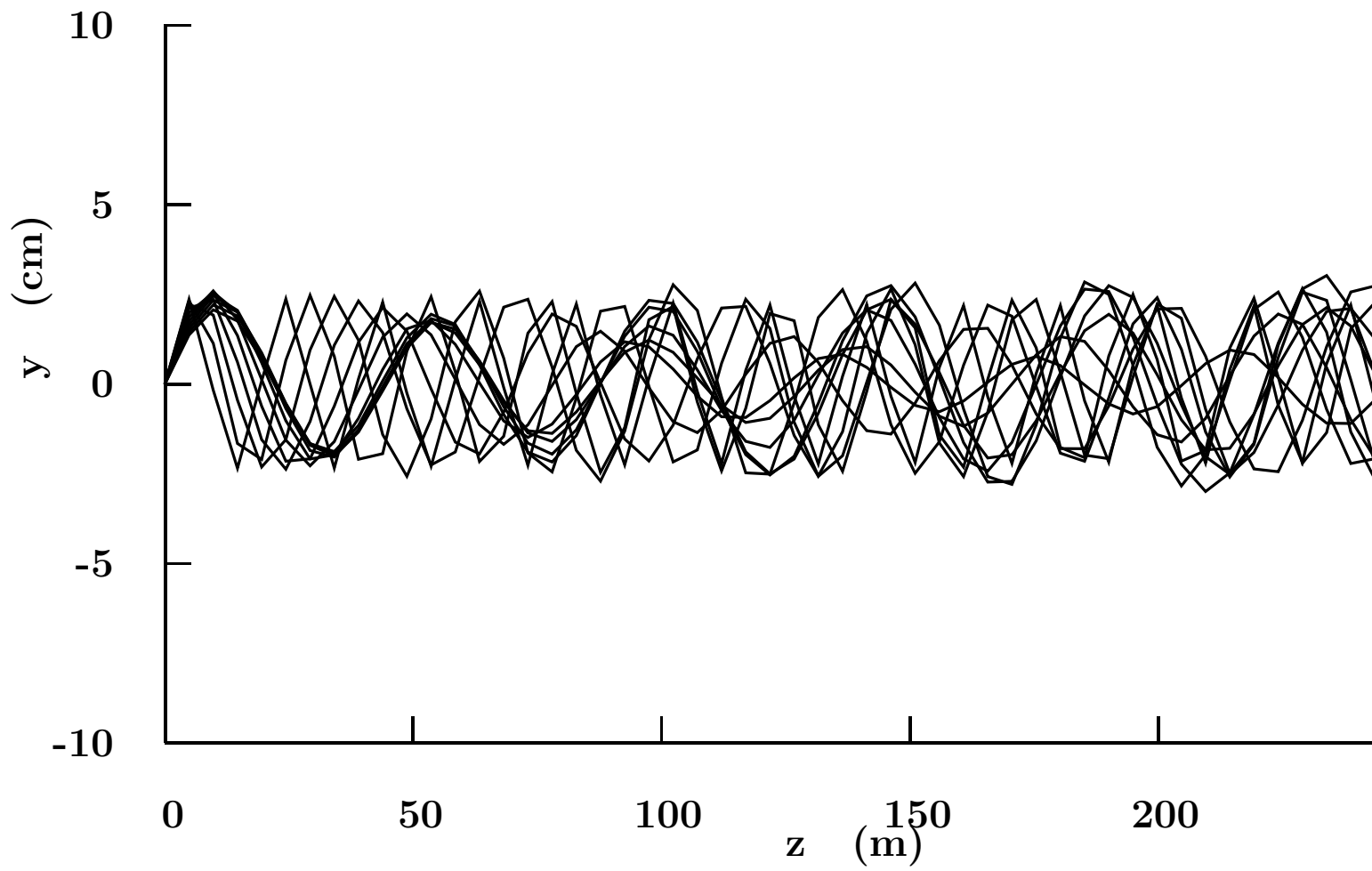


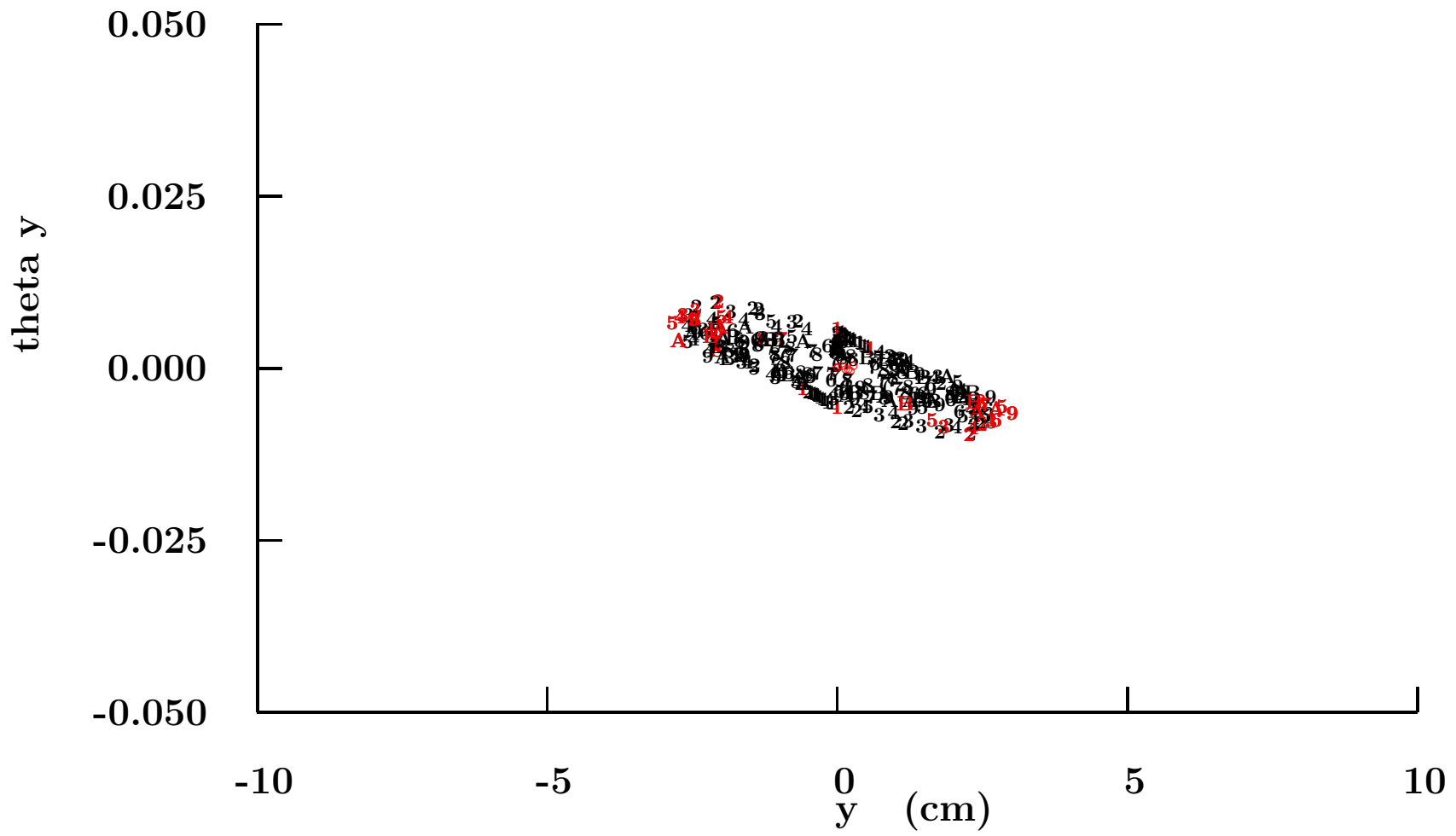
tune crosses 1/3

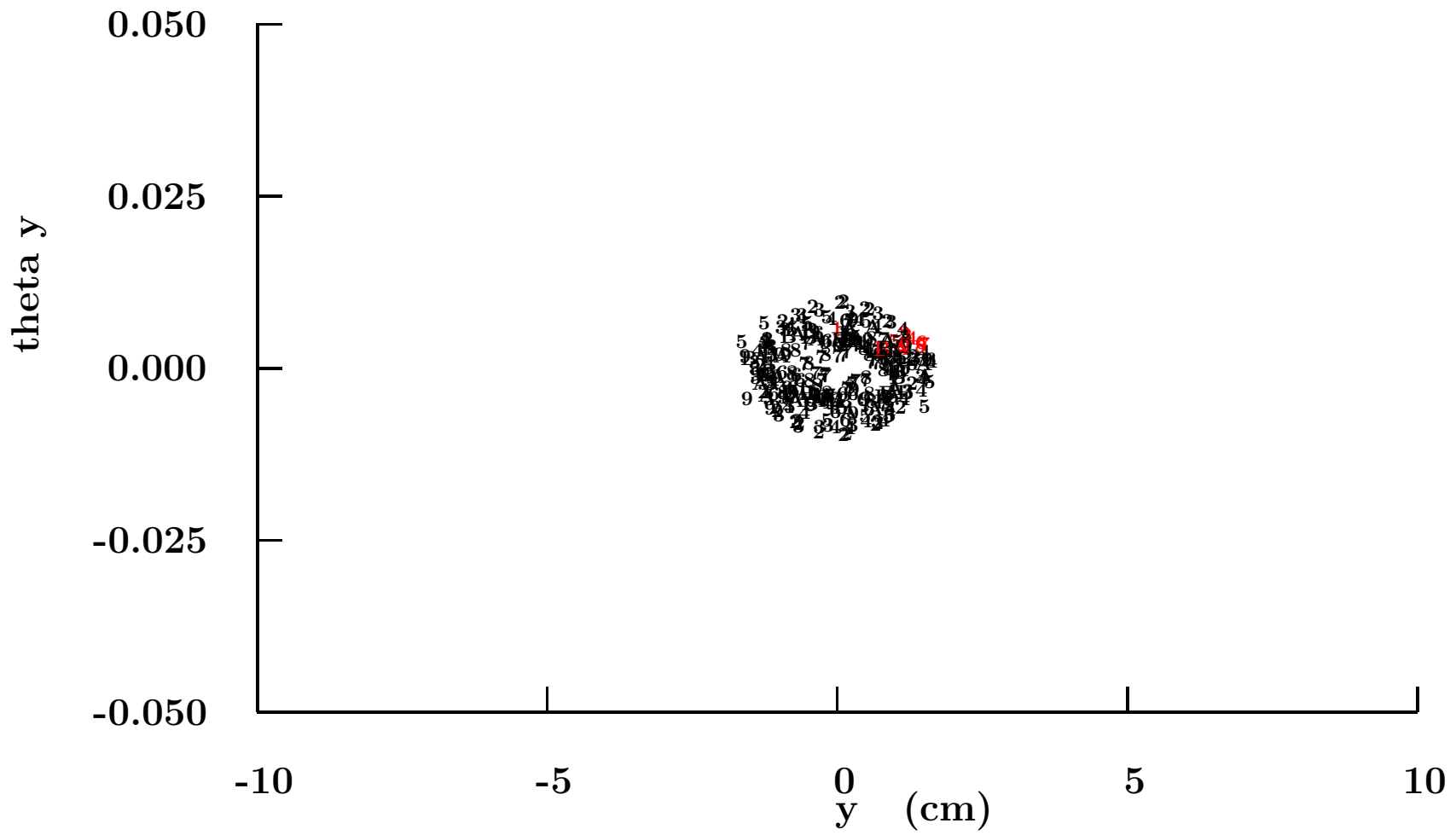




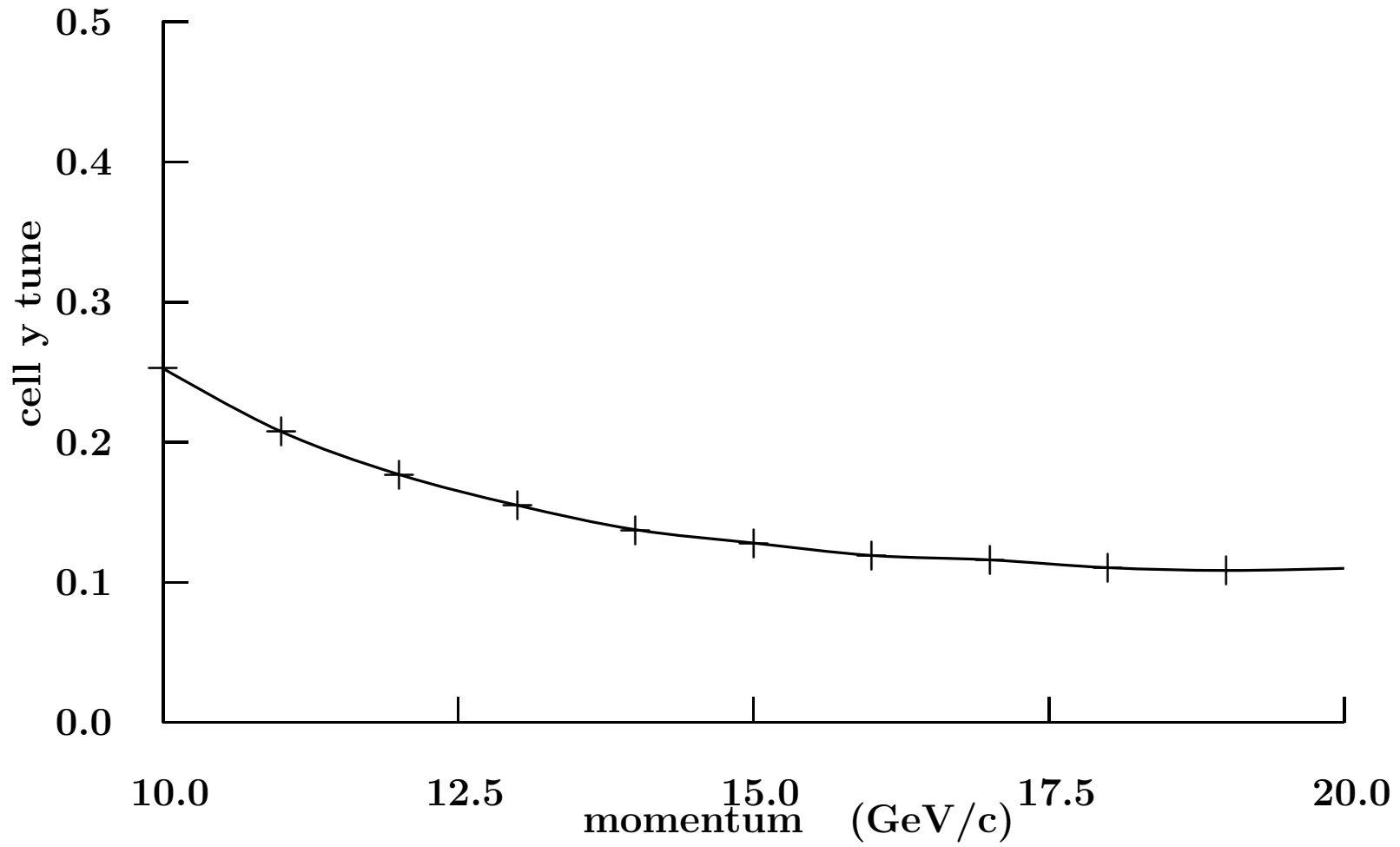






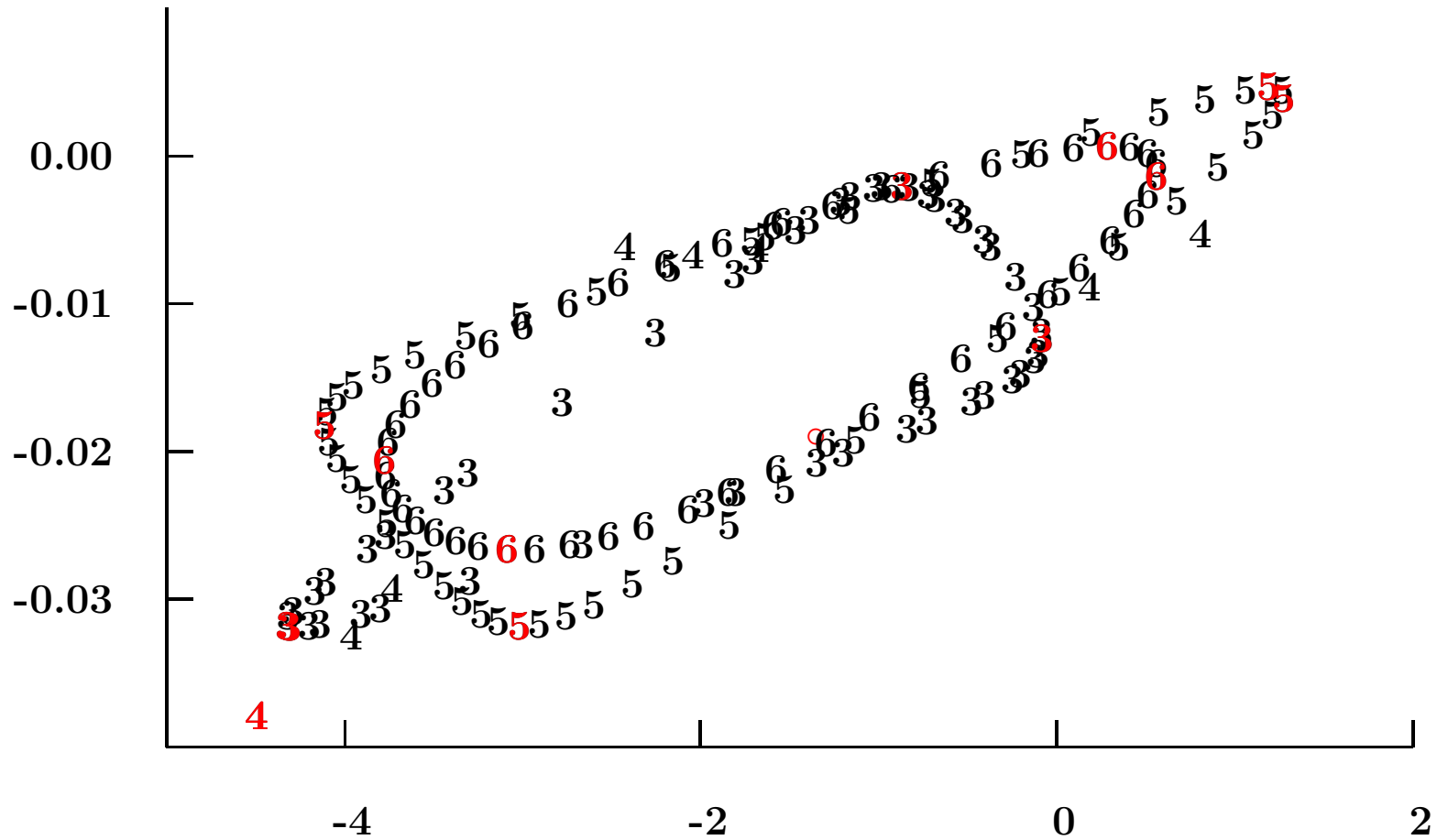


Tune starts at 1/4

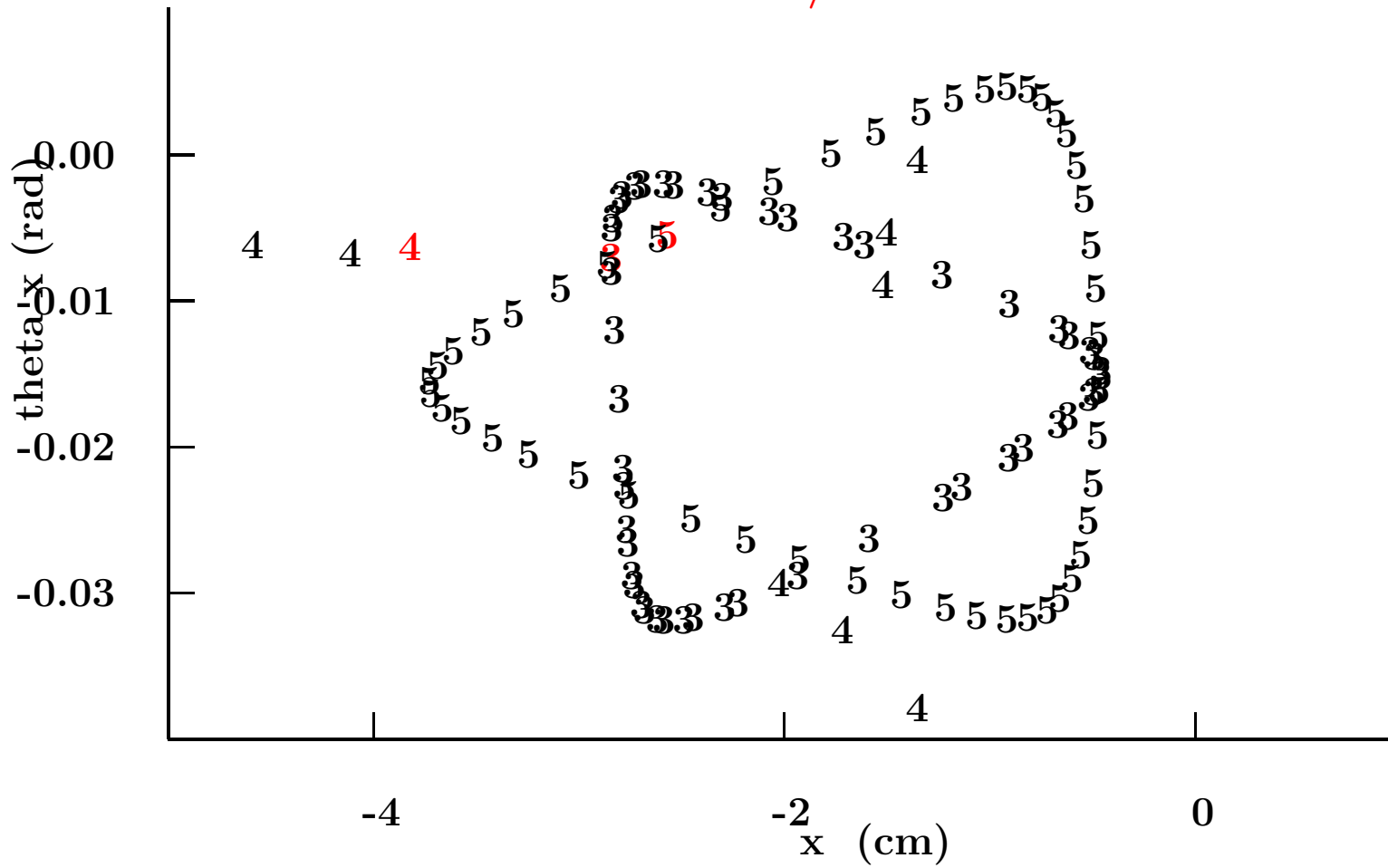


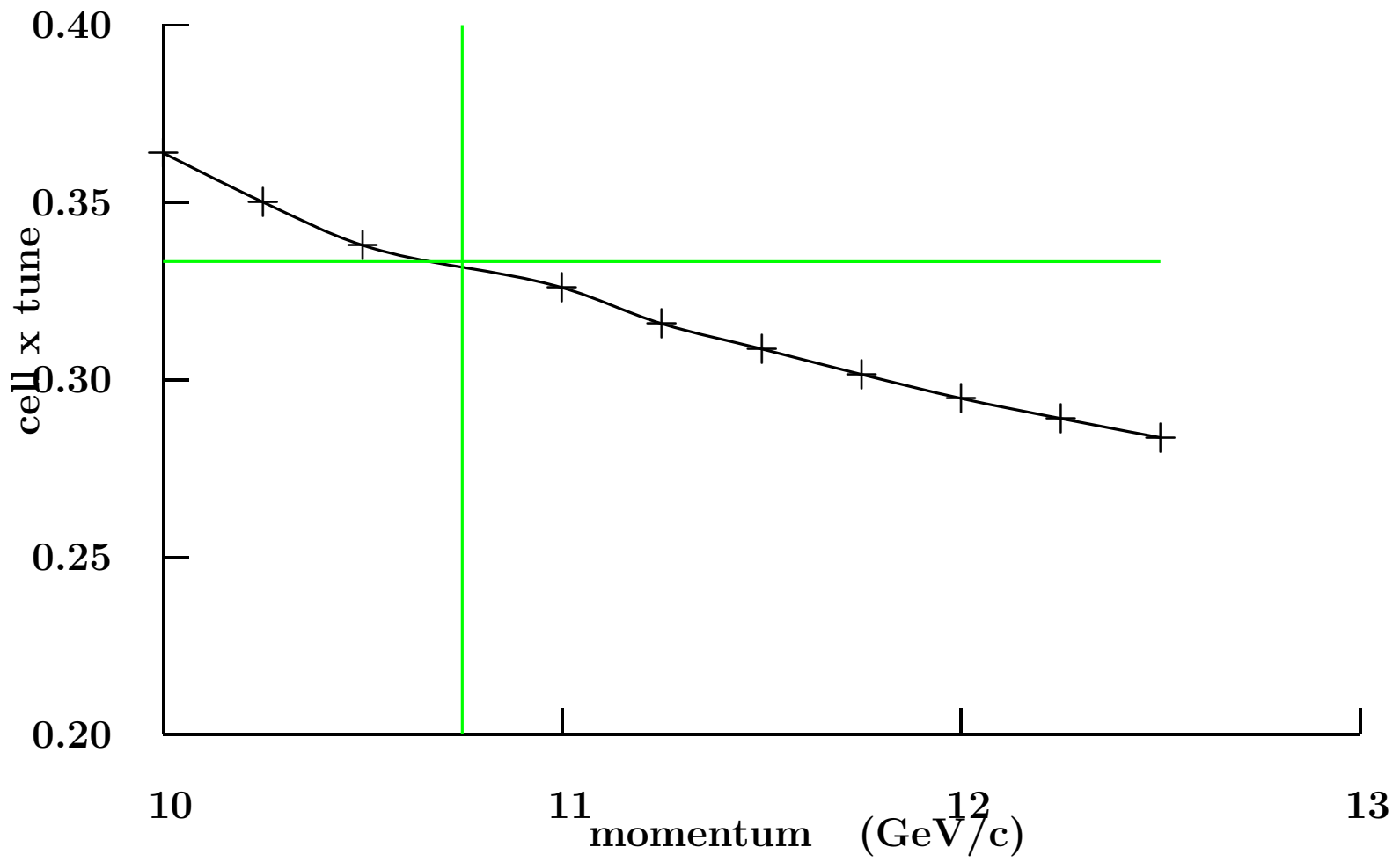
Emittance 20 pi mm

Resonance in x at 10.75 GeV

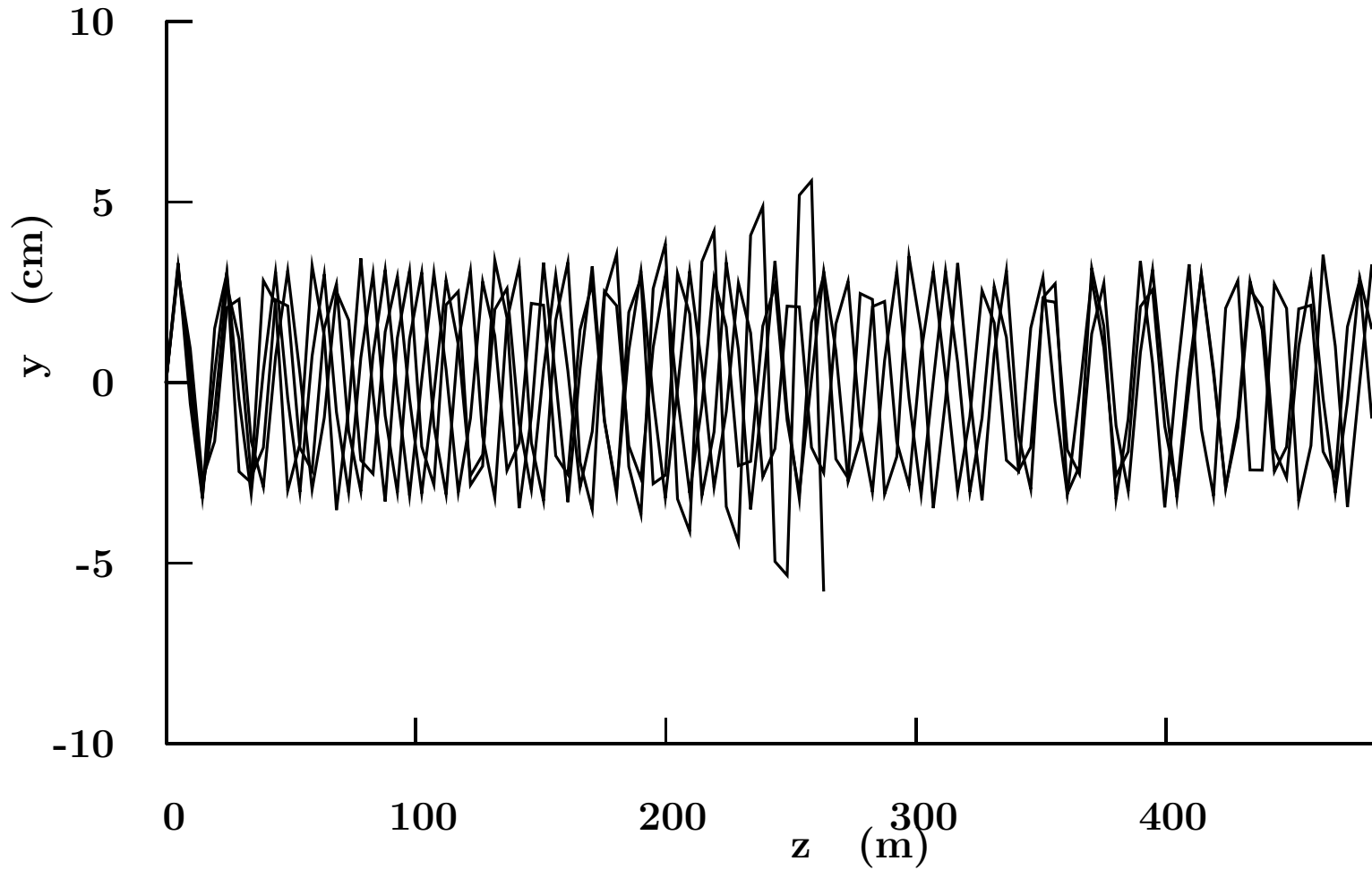


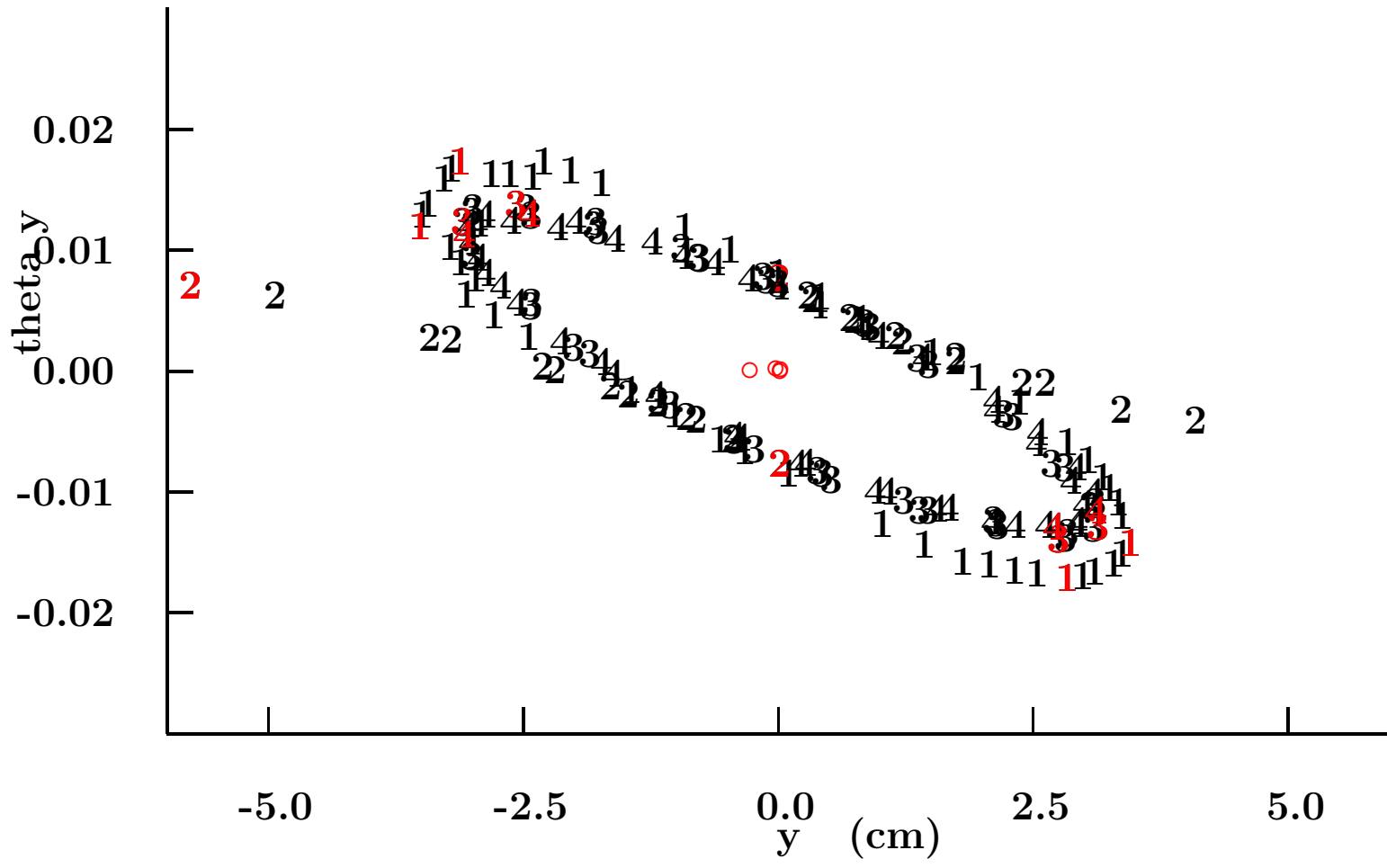
3=10.5 4=10.75 5=11.0 GeV/c

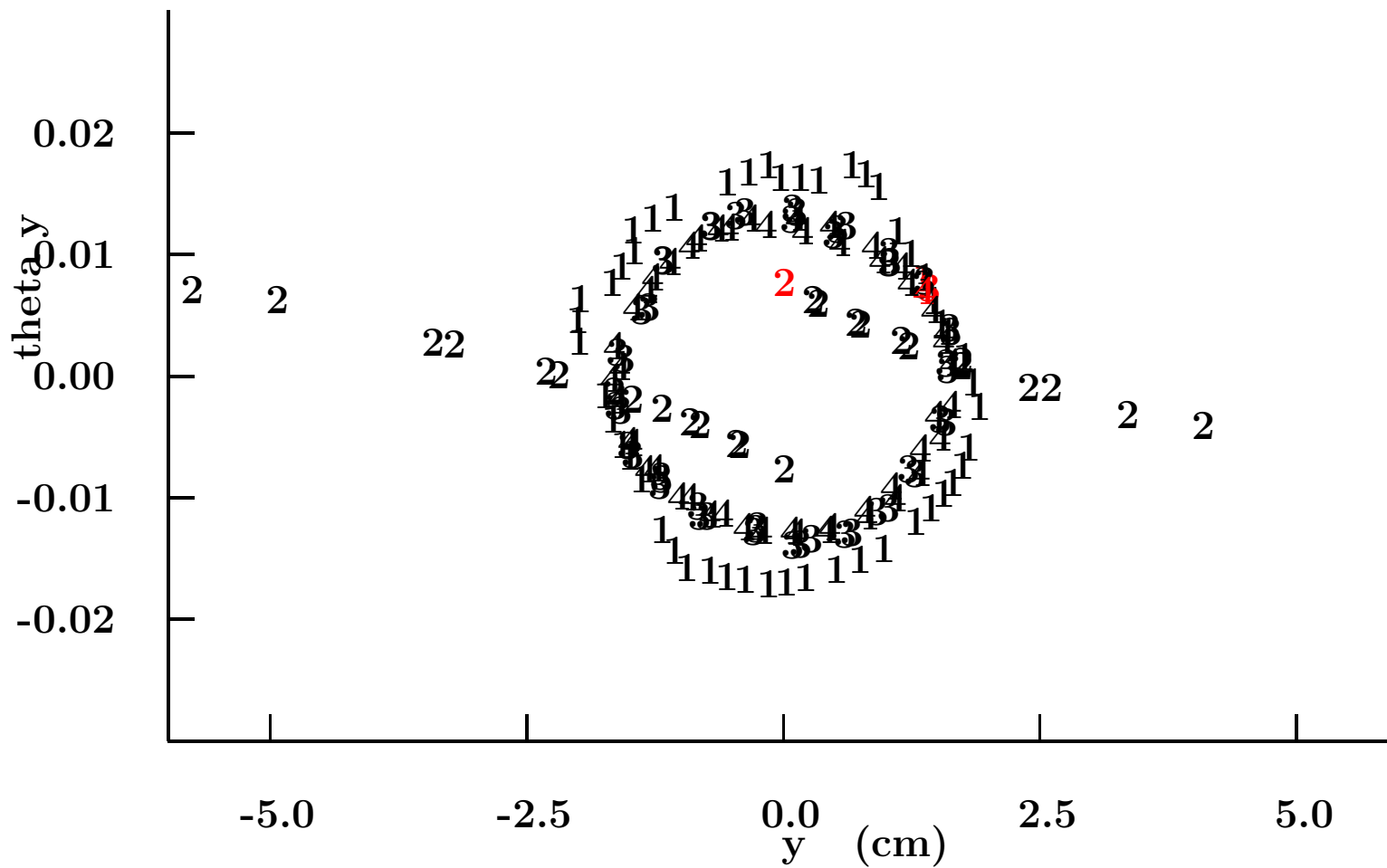


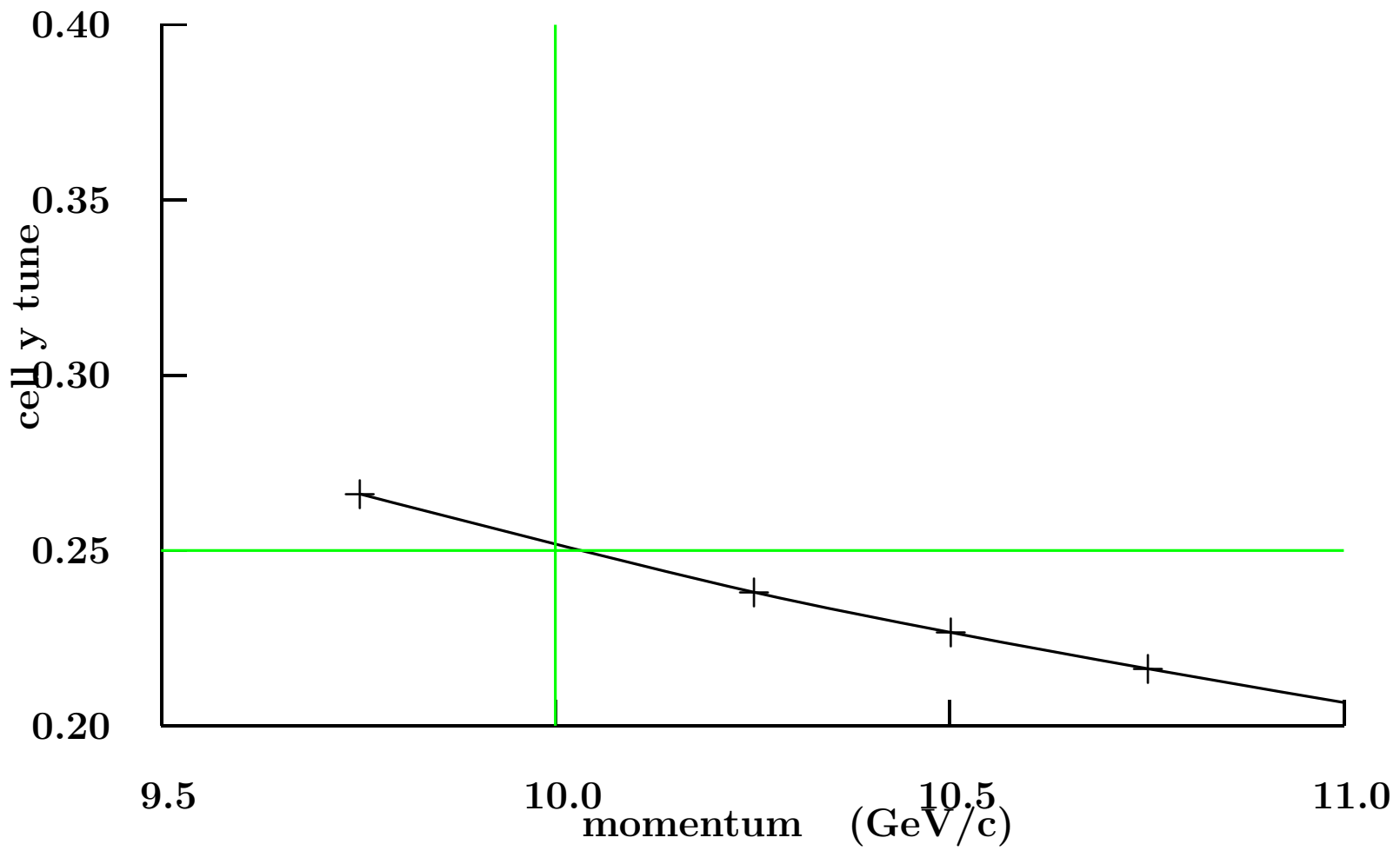


Resonance in y at 10 GeV









Conclusion

- Assymmetric lattice is a pain to get simulation and analysis right
- Tunes close to those from Berg
- Acceptance ok at 30 pi mm without end sextupoles
- Two resonances kill beam above a few pi mm
 - in x at tune=1/3 at 10.5 Gev
 - in y at tune=1/4 at 10 GeV
- I will now study correction with body sextupoles
- and work on injection/extraction